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# Projecting the Future Availability of the Informal Support Network of the Elderly Population and Assessing its Impact on Home Care Services

by Yves Carrière, Janice Keefe, Jacques Légaré, Xiaofen Lin, Geoff Rowe, Laurent Martel and Sameer Rajbhandary

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# Symbols

The following standard symbols are used in Statistics Canada publications:

| | |
|---|---|
| . | not available for any reference period |
| .. | not available for a specific reference period |
| ... | not applicable |
| 0 | true zero or a value rounded to zero |
| $0^s$ | value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded |
| $^p$ | preliminary |
| $^r$ | revised |
| x | suppressed to meet the confidentiality requirements of the *Statistics Act* |
| $^E$ | use with caution |
| F | too unreliable to be published |

## Already published:

### Report on the Demographic Situation in Canada (Statistics Canada catalogue no. 91-209-X)

2005 and 2006 Edition

-Portrait of the mobility of Canadians in 2006: trajectories and characteristics of migrants.

2003 and 2004 Edition

-The fertility of visible minority women in Canada;
-Recent immigration to Canada from the Balkans.

2002 Edition

-The fertility of immigrant women and their Canadian-born daughters;
-Healthy aging: the determinants of aging without loss of independence among older Canadians.

2001 Edition

-A comparative study of recent trends in Canadian and American fertility, 1980-1999;
-Changing demographic trends and the use of home care services.

2000 Edition

-Smoking and disability-free life expectancy in Canada;
-Impacts of causes of death on life expectancy at higher ages;
-Family changes and the economic well-being of preschool-age children;
-The emergence of the blended family.

1998-1999 Edition

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-Dependence-free and health-adjusted life expectancy;
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1997 Edition

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-Childbearing performance of married Canadian-born women;
-The fertility of single women;
-The strengthening of majority positions.

1983 Edition

## Already published:

### Occasional

Beaujot, R., E.M. Gee, F. Rajulton and Z.R. Ravanera. 1995. *Family over the Life Course*, Statistics Canada catalogue no. 91-543E.

Desjardins, B. 1993. *Aging of the Population and Seniors in Canada*, Statistics Canada catalogue no. 91-533E.

Dumas, J. and Y. Péron. 1992. *Marriage and Conjugal Life in Canada*, Statistics Canada catalogue no. 91-534E.

Ram, B. 1990. *New Trends in the Family*, Statistics Canada catalogue no. 91-535E.

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1st edition, January 25 2008, 54 pages.

### Demographic Documents (Statistics Canada catalogue no. 910015MPE)

Caron Malenfant, E., A. Milan, M. Charron and A. Bélanger. 2007. *Demographic Changes in Canada from 1971 to 2001 Across an Urban-to-Rural Gradient*, document no. 8.

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Kerr, D. 1998. *A Review of Procedures for Estimating the Net Undercount of Censuses in Canada, the United States, Britain and Australia*, document no. 5.

Bédard, M. and M. Michalowski. 1997. *Advantages of the One Year Mobility Variable for Breaking Down Interprovincial Migration by Age, Sex and Marital Status*, document no. 4.

Bourbeau, R., J. Légaré and V. Emond. 1997. *New Birth Cohort Life Tables for Canada and Quebec, 1801-1991*, document no. 3.

Smith, G. 1996. *The Population in Collective Dwellings: Canada, 1971-1991*, document no. 2.

Verma, R.B.P., S. Loh, S.Y. Dai and D. Ford. 1996. *Fertility Projections for Canada, Provinces and Territories, 1993-2016*, document no. 1.

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# Projecting the Future Availability of the Informal Support Network of the Elderly Population and Assessing its Impact on Home Care Services

Yves Carrière[1], Janice Keefe[2], Jacques Légaré[3], Xiaofen Lin[1], Geoff Rowe[4], Laurent Martel[4] and Sameer Rajbhandary[1]

## Introduction

In Canada, there has been growing discussion over the aging of the population and other socio-demographic trends which affect the availability of the informal support network of the elderly population. Noting the lower fertility rates of baby boomers, the increased participation of women in the labour force and changing family structure in terms of increased divorce and reconstituted families, assumptions of continued high level assistance from informal support networks -family and friends- are often criticized.

The main objective of this research is to project the future availability of informal support network to meet the need for assistance in performing everyday activities among the disabled elderly population for the period 2001 to 2031. The research examined both sides - supply and demand - of the projected increases in need for assistance for disabled older persons. Future trends are analyzed in terms of demand for support, (that is, changes in the rates of disability among the elderly population), and supply of informal support, (which is largely related to the extent and composition of the family network). Data from two national surveys, the 1996 National Population Health Survey (NPHS) and the 1996 General Social Survey (GSS), are used to identify factors associated with disability and sources of assistance among the elderly population. These results were entered into Statistics Canada's *LifePaths* microsimulation model to project the use of informal and formal networks in the future. The model also incorporates three disability scenarios to test the sensitivity of the projections when different assumptions are considered. The implications of these trends on the future need for chronic home care services are discussed.

The results show that for the period 2001 to 2031, the average annual growth rate of the number of disabled elderly needing assistance could be about 2.5%. However, the sensitivity analysis shows that an improvement in the health of the population could reduce in a non negligible way this growth rate.

The results also show that, all things being equal, a greater proportion of elderly persons living with a spouse would relieve some of the pressure on the formal network. This positive effect could be dampened in part when joint survivorship is also meaning joint disability.

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## 1 Literature

The aging of the baby boomers and the increasing life expectancy at age 65 will accelerate the growth in the number and in the proportion of elderly people over the next three decades. An aging population also means a population where the prevalence of chronic diseases will increase and where social services become just as important, if not more, than the provision of medical services (Carrière and Légaré, 2000). Health and social support are among the most important factors related to quality of life for elderly. When studying the disabled elderly population, the concept of health will necessarily be very different from the one perceived by younger and healthier individuals. Once an elderly person needs assistance in performing activities of daily living (ADLs) and instrumental activities of daily living (IADLs), the concept of health and well-being has to be expanded to include the adequacy of the assistance received. If needs are being met by the formal and/or informal support networks, we would tend to think that quality of life is greater than when needs are not being met. Thus, social services should be considered as a major contributor to the health and well-being of the elderly population (Colvez and Ridez, 1996). Just as reducing to meet the financial need of the elderly population poverty among the elderly population has been a priority for public policy since the 1960s, meeting the required needs for assistance to perform activities of daily living and instrumental activities of daily living should become a major concern of public policy over the next few decades. With the changing nature and extent of the family network, the main component of the informal network, pressure on the formal support network could be much greater in the near future.

### 1.1 Demographic factors driving future need

Because home care services are more social than medical and are often provided by the informal support network, factors affecting the availability of the informal support network are important to consider for projecting the need for home care services. In fact, most disabled persons receive services from their informal support network – mainly family, but also friends and neighbours. Hébert and colleagues in their study on resources and costs associated with disabled elderly (2001) confirm previous studies in which 70% to 80% of the care of disabled elderly individuals living at home is provided by informal caregivers. Similarly, Lafrenière et al. (2003) found that more than 70% of the hours of services provided to disabled elderly persons at home were attributed to the informal network. Spouses were most likely to be the primary caregivers for elderly persons in need, followed by daughters, daughters-in-law and sons. Siblings who live close by were more likely to help with instrumental activities of daily living as compared to personal care. Similarly, other family members such as nieces, nephews and cousins were less likely to help and the help they provided tended to be for activities like transportation and grocery shopping, and not personal care (Chappell, 1992; Keating et al., 1999). More precisely, it was the adult daughters who assumed the greater amount of caregiving responsibility towards elderly parents (Guberman and Maheu, 2000; Keating et al., 1994). Keating et al. (1994) challenge the assertion that informal care to seniors is provided by what would be defined as a "network". They feel that the informal "network" is often a smokescreen behind which stands a solitary figure, usually female. According to Himes (1992), as the baby boom generations age it is women who have a greater probability of having to provide care for children as well as elderly parents.

Among the many factors that should be investigated to better project the future needs in formal services - considering that the family network is the main provider of assistance - are the living arrangements of the elderly population and the composition of the family network (e.g. spouse, children). Also, there are gender issues that will need to be taken into account in the future.

When looking at living arrangements, it has been found that living alone is a major predictor of use of formal services for disabled elderly (Chappell, 1985). For example, Grabbe and colleagues (1995) found that those living alone were most inclined to use formal services. Likewise, those living with others had the greatest probability of using only informal sources (Carrière et al., 2005). More specifically, those living with their spouse were more likely to rely on their spouse to receive the needed assistance (Walker, Pratt and Eddy, 1995) while childless elderly and the elderly living apart from their children were more likely to use social services than were elderly living with their children (Choi, 1994). One factor that will influence the living arrangement of future seniors is the narrowing gap in life expectancy between men and women. The mortality gap between men and women has decreased since the late 1970s (Nault, Roberge, and Berthelot, 1997) and it may result in fewer older women living alone and greater availability of informal support. If this trend continues, it could, in relative terms, decrease the demand for formal assistance.

The nature and extent of the family network has changed over time and it will undoubtedly go through many more changes over the next few decades. Most parents of the baby boomers had several children. When the parents of baby boomers are in need of assistance

to perform their daily activities, they can count on either their spouse or their children. Baby boomers also tend to have brothers and sisters that may be in a position to give them assistance in old age. However, up to now brothers and sisters have not been a major provider of assistance. Spouse and children are mostly the ones providing help to disabled elderly. By being the first generations to limit their fertility below replacement rate (which is 2.1 children per woman), baby boomers have somewhat limited their potential support network. Moreover, their own children will in turn have very few brothers and sisters in addition to having few children of their own. The nature and the extent of the family network are therefore likely to change as the population ages (Stone, 1993). Furthermore, an increasing divorce rate could affect the availability of informal support. Studies tend to show that disabled divorced elderly in need of assistance to perform daily activities might have difficulties in finding the support they need within their social network (Connidis and McMullin, 1994; Martel and Légaré, 2000). Also, relationships that end in divorce may distance parents from their children. For example, it was found that divorce can induce a more negative impact on adult children/parents relationships than widowhood, especially in the case of child/father relationships (Carrière and Martel, 2003; De Jong Gierveld and Dykstra, 1997; Harris and Furstenberg, 1995; Kaufman and Uhlenberg, 1998; Pezzin and Steinberg Schone, 1999). Barrett and Lynch (1999) found that among divorced elderly persons, women were more apt to receive support from their children than men. Moreover, it was found that children had even less contact with their biological father if he remarried (Bulcroft and Bulcroft, 1991).

Finally, gender is a critical factor when projecting availability of informal support. For example, as noted above, the narrowing of the mortality gap between gender should tend to lower the demand for formal assistance. On the other hand, daughters and daughters-in-law are high on the list of potential providers of informal assistance to disabled elderly. The majority of female caregivers aged 45 to 64 are also working at a job or business (63%), most in a full time capacity (Cranswick, 2003). Now that women are full participants within the workforce they may not want to retire partially or totally in order to provide daily assistance.

### 1.2 Utilization of the formal network

The formal network may be an integral part of the total support system, but in comparison to the informal network it provides significantly less amounts of care to elderly persons living at home. As mentioned above, when looking at the total number of hours of services being provided in 1996, Lafrenière et al. (2003) found that for four activities mostly linked to home care support, more than 70% of hours had been provided by members of the informal network. Also, in 2002, 39% of senior women and 46% of senior men received all of their care from informal sources (no change from 1996). At the same time, the proportion of older adults who received care from formal sources alone fell from 31% of women to 25% of women, with no change for men (Cranswick, 2003).

Some studies examine the characteristics of caregivers and care recipients who utilize formal services to determine whether there are predisposing factors that predict service utilization. Differences in the type of linkage between formal and informal supports are accounted for by key variables: caregiver gender, living arrangements, level of physical impairment and care-related health changes in the primary caregiver (Noelker and Bass, 1989). Kosloski and Montgomery (1994) report that the predisposing variables of the elder's age and the relationship with the caregiver were better predictors of activities of daily living services compared to instrumental activities of daily living services. Functional limitation has been found to be the best predictor of formal home care services (Grabbe et al., 1995; Tennstedt, Crawford and McKinlay, 1993; Wan, 1987). Other research has found that the number of hours of services being provided by the formal network is positively associated with functional limitations. However, this relationship was not significant for those receiving only informal assistance (Lafrenière et al., 2003). This result would seem to underline the fact that the relationship between care recipient and caregiver differs quite significantly in a formal setting versus an informal setting. Among other predisposing factors, age of care recipient also comes into play. Data released from the 2002 General Social Survey indicate that the majority of seniors aged 65 to 74 received all of their care from informal sources. By the age of 75, especially for women, family and friend care was supplemented or replaced by care from formal sources with the reliance on a mix of care increasing with age (Cranswick, 2003).

In addition to these characteristics, research in the area of rural aging suggests that utilization of formal services may be impeded by the limited availability of these services in rural areas compared to urban areas (Keating, 1991). Analysis of the 1996 General Social Survey presents data which questions this assumption. Keefe (1999a) found that rural elderly were as likely to receive assistance or use formal supports as their urban counterparts.

Finally, other research examining the linkages between informal and formal support has focused on understanding whether formal services substitute for or complement tasks provided by informal supports (Cantor, 1979; Cantor and Little, 1985; Chappell, 1992; Litwak, 1985). Using 1996 data, Lafrenière et al. (2003) found that there was no significant relationship between the number of hours provided by the formal network and the hours provided by the informal network, meaning that an additional hour provided by the former did not significantly reduce the number of hours provided by the latter. This result does not support the substitution theory, but instead seems to indicate that formal support complements tasks provided by the informal network.

### 1.3 Continuing care policy issues

Currently, there is no national policy addressing family members caring for disabled elderly in Canada; all community care policies governing home care programs are under provincial jurisdiction. Services provided by the formal network to assist elderly persons to remain in the community are provided through government-sponsored home care programs or through private enterprises. Publicly-funded home care programs exist in every province and territory in Canada and their expenditures have increased over 100 percent in the late 1990s (Health Canada, 1998). Previously, institutionalisation was a popular way of taking care of disabled elderly persons. The primary reason for this changing policy was tied to the high cost of caring for someone in an institution while in many cases services could have very well been provided through home care.

The notion of cost-effectiveness of home care for chronic care needs of the population is mostly related to three factors. First, capital expenses are lower in the home since governments are not in the business of providing the capital expense for the building/shelter costs. Second, the majority of the workers in home care are para-professionals and they are generally underpaid compared to their hospital/long term care facility equivalents. Finally, as was said before, informal caregivers provide the majority of the care.

Today, community care policy looks like a good way of limiting the increasing expenditures related to an aging population. However, Hébert and colleagues (2001) are more cautious when looking at the lower cost argument in favour of home care. They agree that generally, care at home and in intermediate facilities is less expensive than care in nursing homes. However, the argument does not seem to hold when looking at severely disabled people. There would seem to be a limit to the efficiency of home care, especially for those severely disabled people. Moreover, within the post acute care home care model, evaluation of the total system costs have not provided definitive cost savings – particularly if costs such as the impact on the informal support system are factor in (Hollander and Chappell, 2002).

There are a number of issues related to the increased pressure to shift care from institutions to the community as a way to cut costs. For example, the home care industry underwent, in recent years, significant system changes including increased privatization of care provision, increased competition and growth of large and often complex organizations (Close et al., 1994). The way in which home care services are organized is also undergoing changes. Labour restructuring, in terms of a growing number of contract and part-time workers, is occurring as is increased medicalization of home care services (Close et al., 1994; Keefe, 1999b).

Central to this policy discussion is having adequate human resources to carry out front line services. This labour force is often described as having limited training, low wages, few benefits, and limited supervision. In the US, the availability of these home help aide or home support workers is decreasing and the possibility of shortage of workers looms in Canada as well. In Canada, the challenge in home care labour varies provincially as public home care programs are under provincial jurisdiction with the exception of services offered through the Departments of Veteran Affairs and Indian and Northern Affairs (Keefe, 1999b). Until recently there has been only limited attention to researching Canadian home care workers. A sector study on home care was the first national-wide approach to understanding human resource issues, both paid and unpaid, in the delivery of home care services (Canadian Home Care Sector Study Corporation, 2003).

Finally, gender is an important contextual variable in the discussion of human resource issues in home care, either within the formal or the informal network. The majority of these home care workers, both professional and non-professional, are women. The low wages and limited benefits which characterize their employment may be understood in the context of women's underpaid labour generally, and specifically the undervaluing of work performed in the private sphere of the home (Baines, Evans and Neysmith, 1991). Bornstein (1994) argues that the caregiving dilemma goes beyond the fiscal dilemma of expecting women to provide unpaid

and underpaid care and suggests the core problem is how we value seniors in our society and the government's responsibility to provide adequate care.

### 1.4 Summary

Demographic changes in the Canadian population in tandem with changes in the composition of informal network will likely have a significant impact on the need for formal support in Canada. There is not necessarily a demographic crisis in Canada because of the aging of the population, but the arrival of the baby boomers raises new challenges. It is critical that more attention be given to understanding the impact of these changes and for what type of policy changes need to be considered.

This study has allowed us to evaluate the impact of the potentially decreasing availability of informal support – mainly looking at decreasing fertility and the changing nature of living arrangements – on the use of formal services. Of course, we also had to make projections on the number of elderly persons who would potentially be disabled in the future while making assumptions on rates of institutionalization, as those living in an institution do not require home care services. Findings are discussed in terms of their impact on the future reliance on the formal home care system. As any projections, they should not be regarded as predictions, but as a tool to better understand what lies ahead if patterns of use of formal and informal assistance remain constant.

## 2 Factors associated with need for assistance and source of assistance

This section provides an overview of the first part of the research. The objective is to identify the factors associated with the need for assistance in performing everyday activities, along with those associated with the use of informal and formal support networks. To achieve these goals, secondary data analysis of existing Statistics Canada datasets was undertaken.

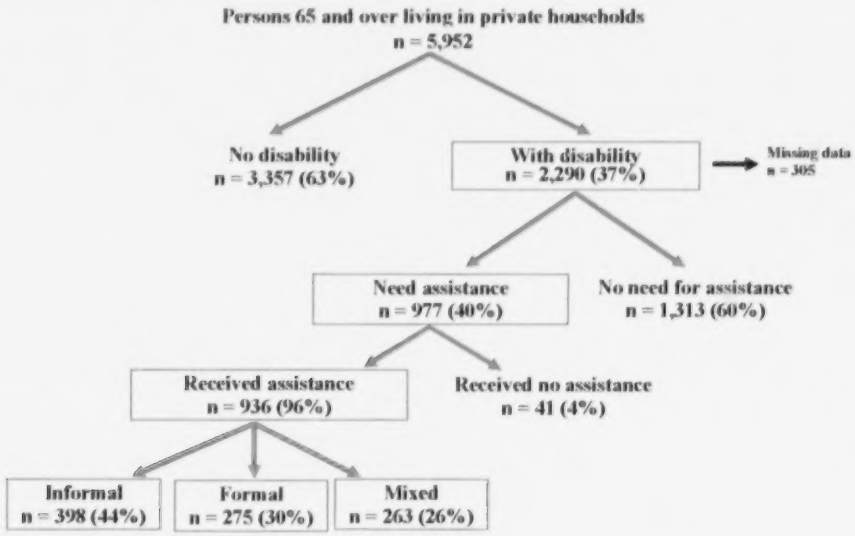
### 2.1 Methodology

A multinomial ordered logistic regression was conducted using the 1996 National Population Health Survey (NPHS) to compute probabilities of having a disability (no, mild, moderate, or severe disability) (see text box "Definitions"). This procedure enabled us to estimate the probability, for a given individual with specific characteristics, of having a certain level of disability. Note that this regression analysis was only performed on those aged 45 and over living in private households.

A second logistic regression was then performed, this time using only the sample of those elderly with a disability, to estimate the probability of expressing a need for assistance related to their level of disability and other socio-demographic characteristics. It is important to note that a need for assistance not related to a disability is disregarded here. Data from the 1996 General Social Survey (GSS) were used for this analysis (see text box "1996 General Social Survey – Social and Community Support").[5] For this specific logistic regression, the sample size was reduced to 2,290 persons aged 65 and over having been identified as has having a disability (figure 1). Only four activities are considered throughout this research: grocery shopping, everyday housework, meal preparation and personal care. Only these activities were considered since they are the ones more frequently associated with home care services. The dependent variable (outcome) is dichotomous: need or no need for assistance. Of course, we make the assumption that the more severe the disability, the greater the probability of expressing a need for assistance.

Finally, multinomial logistic regressions were conducted using the 1996 General Social Survey to compute estimated probabilities of using formal, informal or mixed assistance given a specific set of socio-demographic characteristics among those who had expressed a need for assistance. The multinomial regression was performed using only those disabled elderly having received assistance because of their disability. It is important to note that 60% of those

Figure 1
General Social Survey sample population




Note: Numbers are unweighted. Percentages are weighted.

5. The 1996 General Social Survey was used instead of the 1996 National Population Health Survey because this latter survey does not provide information on the source of the assistance being provided.

### Definitions

**Type of assistance**: Because we are most interested in the effect of the changing socio-demographic characteristics on the demand for home care services, we examined assistance received in the areas of everyday housework, shopping for groceries, meal preparation and personal care. With the information collected in the General Social Survey, we also were able to identify the reasons behind the need for assistance: temporary or long term health or physical limitations, temporary difficult times, task sharing in the household, time constraints, etc. In this research we focused on assistance received due to a long term health problems.

**Source of assistance**: The "informal network" includes family, friends and neighbours. The "formal network" includes paid employees (government or non-government employees) or volunteer from a private or public agency. Volunteers are part of the formal network. We use the expression "mixed network" when someone receives assistance from both the formal and informal network.

**Level of disability**: Some attributes of the Health Utility Index (HUI), a composite measure of health status within the 1996/97 National Population Health Survey and the 1996 General Social Survey, were used to define disability. This composite variable is based on the Comprehensive Health Status Measurements System and takes into account both the quantitative and qualitative aspects of health. First, it provides information on the functional health of an individual using the following attributes: vision, hearing, speech, emotion, mobility, dexterity, cognition, and pain and discomfort. The Health Utility Index is a single numerical value ranging from 0 to 1 and it takes into consideration any possible combination of levels of the eight self-reported health attributes. This numerical value also embodies the views of society concerning health status based on personal preferences about various health states from a representative sample. The first three attributes (vision, hearing and speech) were dropped since they were not predictors of need for assistance. Emotion was a predictor of need for assistance but it was also dropped as the questions were not indicative of long term health needs, an area of interest for this research. For the purpose of this research, levels of disability were defined as follows:

- No disability
- Mild disability:
  - Mobility problem but do not need any help;
  - Dexterity problem but do not need any help from someone else (may or may not use special equipment);
  - Somewhat forgetful and a little difficulty in thinking;
  - Moderate and/or severe pain prevents performing some or few tasks.
- Moderate disability:
  - Requires wheel chair or mechanical support to walk;
  - Dexterity problem and need help to perform some tasks;
  - Very forgetful and a lot of difficulty in thinking;
  - Severe pain prevents performing most tasks.
- Severe disability:
  - Can not walk or need help from others to walk;
  - Dexterity problem and need help for most or all tasks;
  - Unable to remember or think.

### 1996 General Social Survey – Social and community support

Most of the data used for this study came from Statistics Canada's 1996 General Social Survey, Cycle 11: Social and Community Support. The target population for the survey was all Canadians 15 years of age or over living in private households. Full-time residents of institutions as well as residents of the Yukon and Northwest Territories were excluded. Data were collected using Computer Assisted Telephone Interviewing (CATI), systematically excluding households without telephones. Statistics Canada estimates that less than 2% of the target population resides in this type of household and that their characteristics are not different enough from those of the rest of the target population to have an impact on the estimates. Survey estimates were adjusted (weighted) to account for persons without telephones. In total, the sample consisted of 12,756 respondents. The response rate was 85.3%.

Two of the survey's objectives were to learn about the types of assistance Canadians provide or receive, as well as to gain a better understanding of the dynamics that link a person's social network and the assistance this person gives and/or receives. To this end, the questionnaire was designed to collect detailed information on the type of assistance provided or received for the following activities: meal preparation, house cleaning, laundry and sewing, house maintenance and outside work, grocery shopping, transportation, banking and bill paying, personal care (bathing, toileting, care of toenails/fingernails, brushing teeth, shampooing and hair care or dressing) as well as moral or emotional support. Since we were interested in the effect of changing socio-demographic characteristics on the use of home care services, we concentrated on four activities that are more commonly associated with those services: everyday housework, shopping for groceries, meal preparation and personal care.

with a disability had expressed no need for assistance to perform the activities considered in this study. Among those 977 having expressed such a need, 936 had received assistance (figure 1).

### 2.2 Results: the need for assistance in performing everyday activities

The results of this second analysis show the expected association between age and disability, age being positively associated with disability. Being a woman increases the probability of having higher levels of disability. Also, marital status has the expected effect, as past research has shown the protective effect of marriage. Married persons have lower probabilities of having higher levels of disability. As far as level of schooling, the association is very strong; those having no high school diploma, compared to those who do, have a much greater probability of having higher levels of disability. There are also some regional differences as elderly persons living in the province of Quebec have the lowest probabilities.

The results show that those with a severe level of disability were three times (odds ratio of 2.9) as likely to express a need for assistance compared to those with a mild disability. They are also twice as likely as those with a moderate level of disability to express a need for assistance. Also, disabled men were about half as likely to express a need for assistance compared to disabled women. This result could very well reflect the division of domestic labour, especially among these older generations. Disabled men, for example, may not associate the meal preparation done by their spouse as a need for assistance related to their disability, however disabled women will likely make this association if in the same situation. Finally, it is in the Atlantic provinces that the need for assistance is the greatest.

### 2.3 Results: factors associated with the use of informal and formal support networks

Results suggest that among disabled elderly males, those living with a spouse aged less then 75 years old are more likely to receive assistance from their informal network only or a mix of formal and informal. The number of surviving children has no significant effect on the source of assistance that disabled elderly males receive. However, a higher level of schooling increases quite significantly the probability of receiving assistance from the formal network, either in conjunction with the informal network or not. As can be expected, a higher level of disability is associated with greater odds of receiving a mix of formal and informal assistance. As for disabled elderly females, all things being equal, the absence of surviving children increases significantly the odds of receiving assistance from the formal network only. Also, the presence of a spouse is not nearly as significant as it is for disabled elderly males when looking at the odds of receiving informal versus formal assistance. If for males the presence of a spouse, especially if this spouse is less than 75 years old,

increases the odds of receiving assistance from the informal network, this relationship is not significant among disabled females. As in the case of older males, a severe disability was associated with a much greater probability of receiving a mix of formal and informal assistance.

From the results shown in this section, it seems clear that demographic trends will have an impact on the use of formal home care services in the future. A decline in fertility rates affects the extent and nature of our immediate social environment. When baby boomers reach old age, they will have fewer children to provide them with assistance when needed. Results using the 1996 General Social Survey showed that for females, the presence of surviving children lower the odds of using the formal network. If these patterns of utilization are predictors of future patterns, it would indicate that the absolute and relative number of disabled females relying on the formal network will increase. Moreover, trends in divorce rates show that a greater proportion of those cohorts will enter old age as divorced individuals and may be living alone. This will in turn increase the need for formal home care services.

The second part of the research was designed to project the number of older persons with different levels of disability using the results presented above. Based on the results of the second logistic regressions and taking into account the changing nature and extent of the family network, we will then look, using projections done using microsimulation, at the number of disabled elderly who could be using their formal, informal or mixed network in the future.

## 3 The microsimulation model

This section describes the method used to integrate the cross-sectional analysis presented in the previous section to the microsimulation model to produce projections of future needs of home care services. Assumptions for different projection scenarios are also discussed.

### 3.1 Research design

The research design for the projection model included both cross-sectional and longitudinal data. The cross-sectional aspect of the model was partly derived from the analysis presented in the previous section, using data from the 1996 National Population Health Survey and General Social Survey. The longitudinal aspect of the methods, needed to project the family network, was largely taken from the already existing model developed at Statistics Canada. This model, *LifePaths*, makes use of many data sets from surveys conducted by Statistics Canada. It allows the user to take into account part of the complexity of the life cycle of individuals who constitute the Canadian population. *LifePaths* takes account of birth, death, immigration status, interprovincial migration, marital history (including common-law unions), educational history, employment history and the birth and presence of children at home. It is a useful instrument to analyze government policies having a longitudinal component and whose nature requires evaluation at the individual or family level (Wolfson and Rowe, 2004).[6] Obviously, it is a very useful instrument when studying the changing nature and extent of the family network.

Contrary to more conventional demographic projections using a macro perspective, *LifePaths* uses individuals as the basic unit of analysis. The microsimulation creates a synthetic cohort of individuals going through their life cycle with different probabilities of having specific events occurring, probabilities that vary across individuals depending on their characteristics. These probabilities are derived using multivariate analysis on various data sets from surveys made by Statistics Canada. Every time an event occurs, e.g. leaving school, probabilities of other event occurring in the future are updated to take into account the new characteristics.

Not every event occurring in someone's life can be studied with longitudinal data. In many cases, the only data available are cross-sectional in nature and cannot provide the information necessary to feed the microsimulation model. For this reason, results presented above were used in conjunction with the microsimulation model to reach our research objectives. Results discussed in the previous section were applied to subsets of the population to derive, for example, the number of elderly persons with a disability or the number using different sources of assistance. Although the microsimulation approach allows an analysis of the life cycle of every individual in the projection, this is not the case if we want to look, for example, at the number of years a person lived with a disability. Of course, this is due to the fact that we did not analyze the process of disability but instead looked at factors associated with having a disability in a cross-sectional survey. However, we do have a count of the projected number of individuals with a disability at different points in time up until 2031. This same approach was used for disability, need for assistance, living arrangement, receipt of assistance and source of assistance. Figure 2 shows how we integrated the longitudinal and cross-sectional approach in this research.

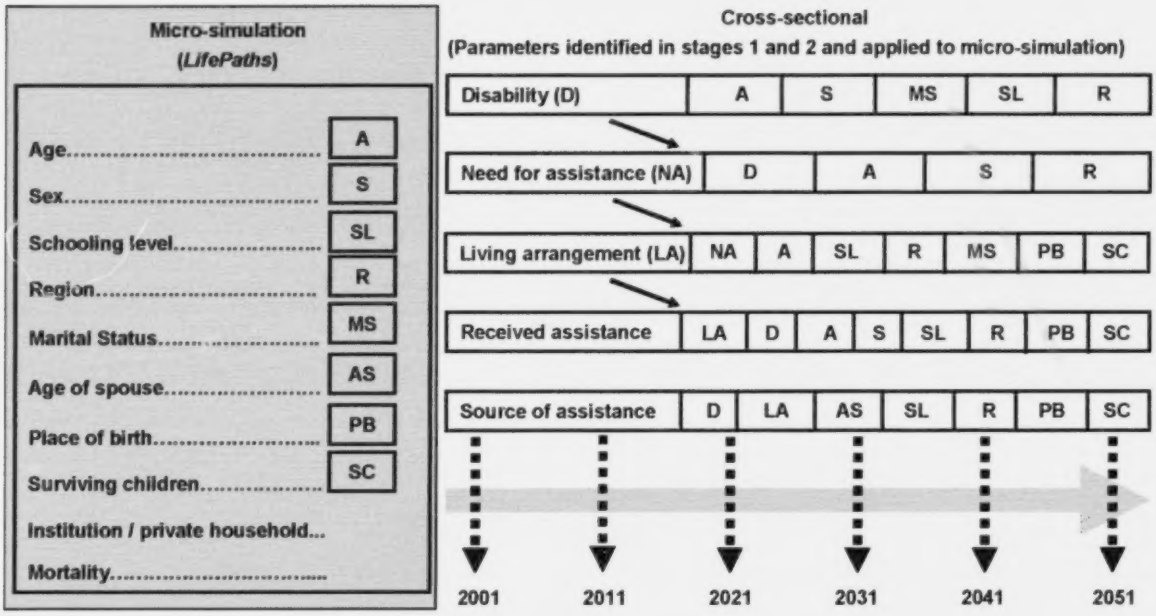
The left part of figure 2 lists the characteristics needed in the logistic regressions performed in the cross-sectional part of the projections. Of course, the microsimulation produces many more characteristics of each individual, but only the ones presented in figure 2 were used in the logistic regressions. We first had to run the microsimulation to get the population by age, sex, schooling level, region of residence, marital status, age of spouse, place of birth and number of surviving children. We also needed to determine who lived in an institution and who lived in a private household. Only the latter population was used in the logistic regressions as, by definition, home care is provided to those who live in private households. As for the cross-sectional part of the projections, each probability (disability status, need for assistance, living arrangement, receipt of assistance, and source of assistance) was applied in the sequence shown in figure 2. As can be seen, we make the assumption that living arrangement is partly determined by the need for assistance. Living with others is then partially seen as a strategy to cope with a need for assistance related to a disability. This was done only for the non married population, married individuals being assumed to live with their spouse.

### 3.2 Assumptions on future disability trends

Results from the logistic regression showed, as expected, that the main factor associated with the need and use of home care services is the health status of the individuals. Therefore, it seems important to test

6. For a detailed description of the *Lifepaths* model: www.statcan.gc.ca.

Figure 2
The microsimulation model




the sensitivity of the projection model to eventual changes in the health of the population. Three different scenarios were used to answer this concern:

1. Probabilities of disability levels held constant at 1996 levels (constant scenario);
2. Probabilities of disability levels gradually decreasing (compression scenario);
3. Probabilities of disability levels gradually increasing (expansion scenario).

In the case of the compression scenario we assumed that the probability of having a given level of disability according to specific individual characteristics would gradually (over a 15 year-period) go down. This was done by giving to an individual of a certain age the probability of having a specific level of disability of someone 5 years younger. As mentioned, this was done gradually over a 15 year-period. After 15 years (2016), the probability of having a certain level of disability is exactly the one of someone 5 years younger. In the case of the expansion scenario, the approach was exactly the same except that this probability is increased to someone five years older instead of 5 years younger.

Our intention here is not to predict the health of the population in the future, but to analyze the impact of an increase or a decrease in the levels of disability in the future. This allows us to analyze the sensitivity of the model to changes in the health of the population. The next section presents the results of the projections.

## 4 Projection results

The projection results are presented in three parts. First, we look at future trends regarding the family network. Two important components of this network are presented: living arrangements and number of surviving children. The former provides the number of elderly living with a spouse, the main provider of assistance for those with a disability. The number of surviving children is also very important as those without a spouse may rely in some part on their assistance. The first part of the projection results can be seen as the supply of informal support from the family. Of course, this supply does not represent the whole informal network as friends and neighbours can also provide assistance to disabled elderly. Secondly, results showing possible trends in the disability status of the population are presented. As mentioned previously, our interest is in the assistance elderly people received because of a disability. If there are no disabilities, it is assumed that an individual should be able to perform the activities considered in this research.[7] Although, an important proportion of disabled elderly do not require any assistance to perform these activities, projecting their number is the first step in trying to estimate the potential overall demand for services. Finally, the last series of results will show the number and proportion of disabled elderly using different sources of assistance. These results will show if the present patterns of utilization of services would result in a relative increase in the use of formal home care services, which is the main objective of this research.

The projection period extends to 2051, providing an estimate of what the Canadian profile could look like given patterns of home care service utilization observed in 1996. The figures presented show a solid line dividing the period 2001 to 2031 from the period 2031 to 2051. Extending the projected period to 2051 allows an examination of the Canadian context once all the baby boomers will have reached the age of 85. Of course, policies and behaviours will be different than they are nowadays, but the exercise helps in understanding what would happen when the baby boomers enter the oldest-old population if the context would remain relatively unchanged. Although most of the analysis covers the 2001 to 2031 period, we will briefly comment on the results for the 2031 to 2051 period.

### 4.1 Availability of family network: the potential supply of family caregivers

Among the informal network, members of the immediate family are the main providers of assistance to disabled elderly. We are focusing here on two very important aspects of the family having a significant impact on the use of the formal network. First, trends in the proportion of elderly males and females living alone will likely affect the number of disabled elderly using formal home care services. The second aspect of these results looks at the proportion of elderly females who do not have any surviving children. Results presented in section 2.3 showed that the probability of using formal services does not vary greatly among persons who have children. If they have at least one child, the probability of using only the formal network changes very slightly. The main difference is between those who have at least one child and those who do not have any children. Our main interest is then to look at future trends in the number and proportion of those who have no surviving children.

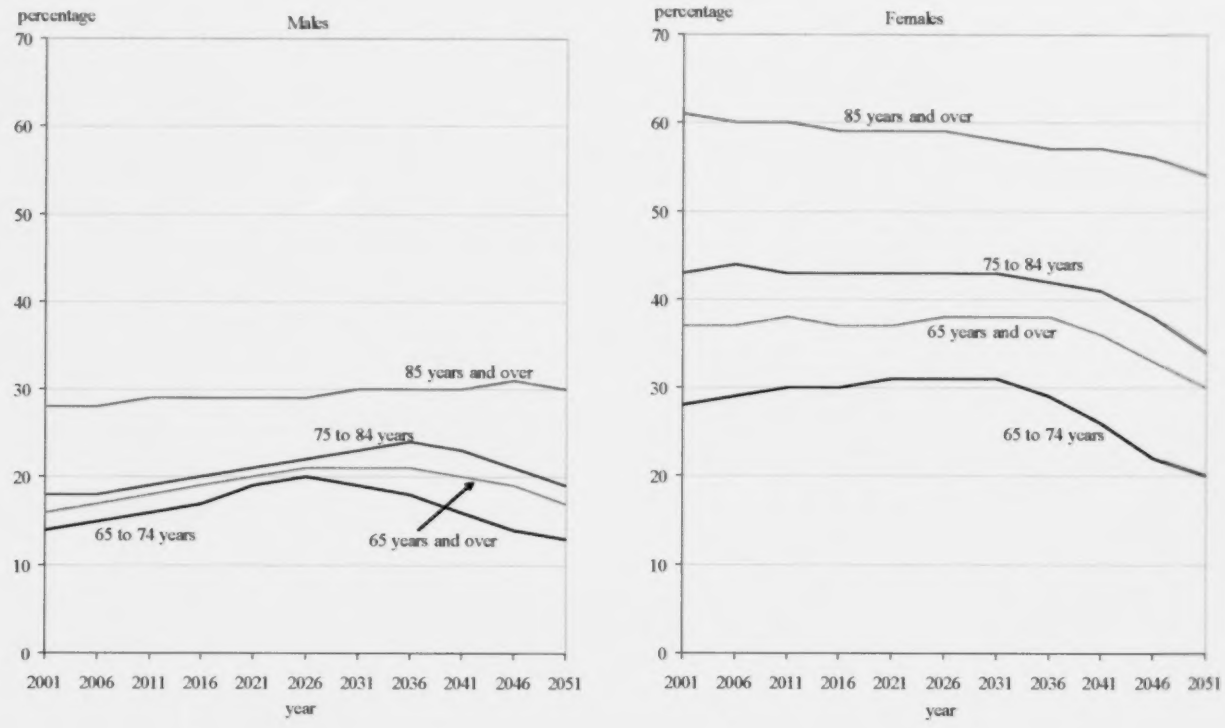
#### Proportion of elderly persons living alone

Projection results point to a stabilization of the proportion of both elderly males and females living alone in Canada for the period 2001 to 2031. This simulation takes into account the fact that future cohorts of elderly persons will have gone through life with a greater probability of getting a divorce compared to today's elderly persons. This trend could point to an increase in the proportion of those living alone. On the other hand, the simulation also takes into account the fact that the gap in life expectancy favouring females will likely diminish in the future, just as it has been the case in the recent past. This trend, contrary to the increase in the probability of getting a divorce, has the effect of favouring joint survivorship and to lower the probability of living alone among the elderly population living in private households.

As can be seen in figure 3, the proportion of elderly females living alone is significantly higher than the proportion observed among males. This is not surprising considering the age differential at marriage – females marrying on average older males – and the differential in life expectancy favouring females. Also, males tend to remarry in greater numbers than females after a divorce or the death of a spouse. However, it is among

7. For a definition of disability and the type of activities considered, refer to the text box "Definitions".

Figure 3
Proportion of persons aged 65 years and over living alone in private households, by sex, Canada, 2001 to 2051




Source: Statistics Canada, Demography Division.

females that we observe a decreasing proportion of people living alone, mainly between the 2031 to 2051 period. Over the entire projected period, the gap in the proportion of elderly females and males living alone decreases quite significantly; from 37% versus 16% in 2001 to 30% versus 17% in 2051. A lower proportion of older females living alone should, all other things being equal, lower the pressure on formal home care services in the future. However, results from section 2.3 showed that the effect of having a spouse is not nearly as significant for disabled females as it is for disabled males. Considering patterns of utilization observed in 1996, a significant drop in the proportion of disabled females living alone will lower pressure on formal home care services only if their spouse provides more assistance.

### Proportion of elderly women without any surviving children

When we think of population aging we tend to focus on the increasing proportion of those over the age of 65 within the total population and their increasing number, especially when considering the gradual arrival of the baby boomers within that age group starting in 2011. The mechanisms that underlie population aging also have other effects. Lower fertility has been the major contributor of population aging over the last few decades. Its impact on the extent and the nature of the informal support network are also important. Parents of the baby boomers have, by definition, many children. These children have many brothers and sisters, but they also have fewer children. As far as we know now, the latter have few siblings and few children. This trend suggests a change in what will be expected from the formal and informal support networks in the future.

The analysis concentrates on those with no surviving children. As mentioned earlier, the number of children has a significant effect on the probability of using the formal or informal networks. This effect is mainly determined by having no surviving children at all compared to having at least one. Figure 4 shows that

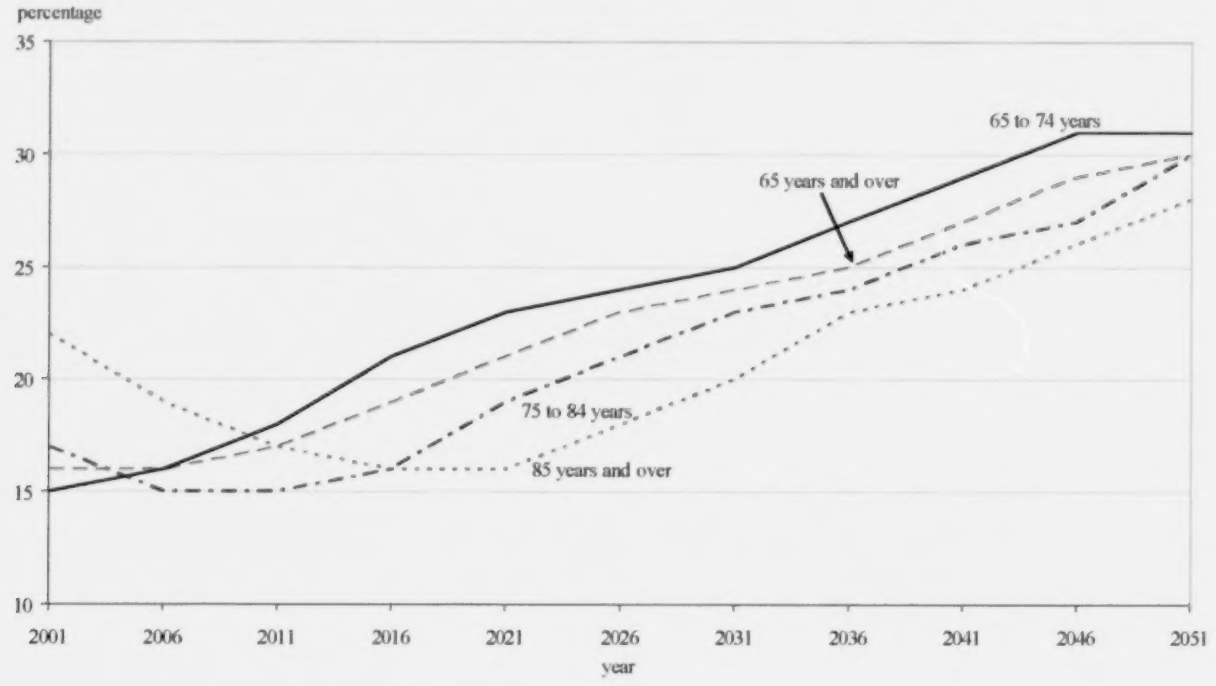
for females aged 65 years and over the proportion without any surviving children increases from 16% in 2001 to a high of 30% in 2051. Close to 1 out of 3 elderly women would be without a surviving child.

Although the proportion of elderly women without any surviving children increases steadily over the projected period, it is important to look at the trend in the different age groups. For the younger age group (65 to 74 years of age), the trend follows the one observed for the whole elderly population. However, the other two age groups show a different pattern. For the 75 to 84 age group, up to 2011 there is a downward trend; the proportion of elderly persons in this age group without any surviving children goes from 17% to 15% before moving up and reaching the 65 plus proportion (30%) in 2051. Of special interest is the trend observed for the oldest old (85 plus). This age group is the most vulnerable health wise and they are the ones who have the highest need for assistance. In 2001, this age group is also the one showing the greatest proportion of people without any surviving children. However, this proportion is decreasing from 22% to 16% between 2001 and 2021, before moving up to 28% in 2051. This trend is of course related to the aging of the baby boomers. In the first part of the projected period (2001 to 2021), the 85 and over age group is mainly comprised of the parents of the baby boomers. By definition these older cohorts had many children. However, as these cohorts are slowly replaced by other cohorts who had fewer children, the proportion of those without any surviving children increases. In 2036, results from the projections show that this proportion among the 85 and over age group will be roughly the same as the one observed in 2001. This suggests, at least in the near future, that the cohort, who is most likely to need assistance, will be more likely to have at least one child. In the short term, all other things being equal, this trend should ease the pressure on formal home care services.

## Summary

When trying to assess the effect of the changing nature and extent of the family network over the next few decades on the demand for formal home care services, many factors should be considered. The microsimulation model provides a look at two of these factors: living arrangement (allowing us to look at spouseless individual) and the number of surviving children. These two trends point in different directions. First, the

Figure 4
Proportion of females aged 65 years and over living in private households with no surviving children, Canada, 2001 to 2051




Source: Statistics Canada, Demography Division.

proportion of elderly persons living alone will be relatively stable from 2001 and 2031. There is a small increase among men while the trend is fairly stable for women. Since today's older males rely more on their spouse then do older females for assistance for everyday activities, there might be, all other things being equal, a small increase on the pressure for formal home care services. However, based strictly on this first factor, the period 2031 to 2051 seems to indicate a downward pressure as the proportion living alone should slightly decrease. Secondly, when looking at the presence of surviving children, the projections indicate an increasing proportion of elderly women without any surviving children. However, up to 2021, this proportion decreases significantly among the 85 and over population as the parents of the baby boomers constitute most of this age group. For the following period (2021 to 2051) pressure on formal home care services should increase as the baby boomers gradually join the oldest old, although the proportion of older females without any surviving children in 2036 will roughly be the same as observed at the beginning of the projected period.

Of course other important factors will affect the supply of home care services provided by family members. For example, expectations from older parents toward their children may be very different from what has been observed in the recent past. Also, even though we looked at the presence of a surviving child, we have not looked at the geographic proximity of those children. This is an issue that would need to be looked at in the future. The family network of tomorrow's elderly population will also be affected by an increased proportion of divorced individuals. Although the microsimulation takes into account the trend in divorce, we know very little about the assistance provided by stepchildren and children of divorced parents, especially assistance toward fathers. More research is needed in this area to better understand the effect of the changing nature and extent of the family network on the demand for formal home care services.

### 4.2 Disability status of the elderly population: the demand side

Of course, the main driver of home care services in the future is the number of disabled elderly persons. Demand is measured through changes in the rates of disability and severity among the elderly population and its affect on need for support. Explaining disability is quite complex and our model only accounts for age, sex, marital status, schooling level and province of residence. Factors like lifestyle, income, and past occupation are not accounted for. Nonetheless, the model allows us to project the number of disabled elderly better then a simple age by sex extrapolation.

This section is divided into two subsections. The first part presents results regarding disability among the population 65 and over while the second part shows results for the elderly population needing assistance. As mentioned in section 3.1, the analysis of disability and need for assistance is not part of the microsimulation, but instead based on results from cross-sectional surveys. We are looking at the factors associated with having a disability and not with those who are predictors of the process of disability.

#### Disability status of the elderly population

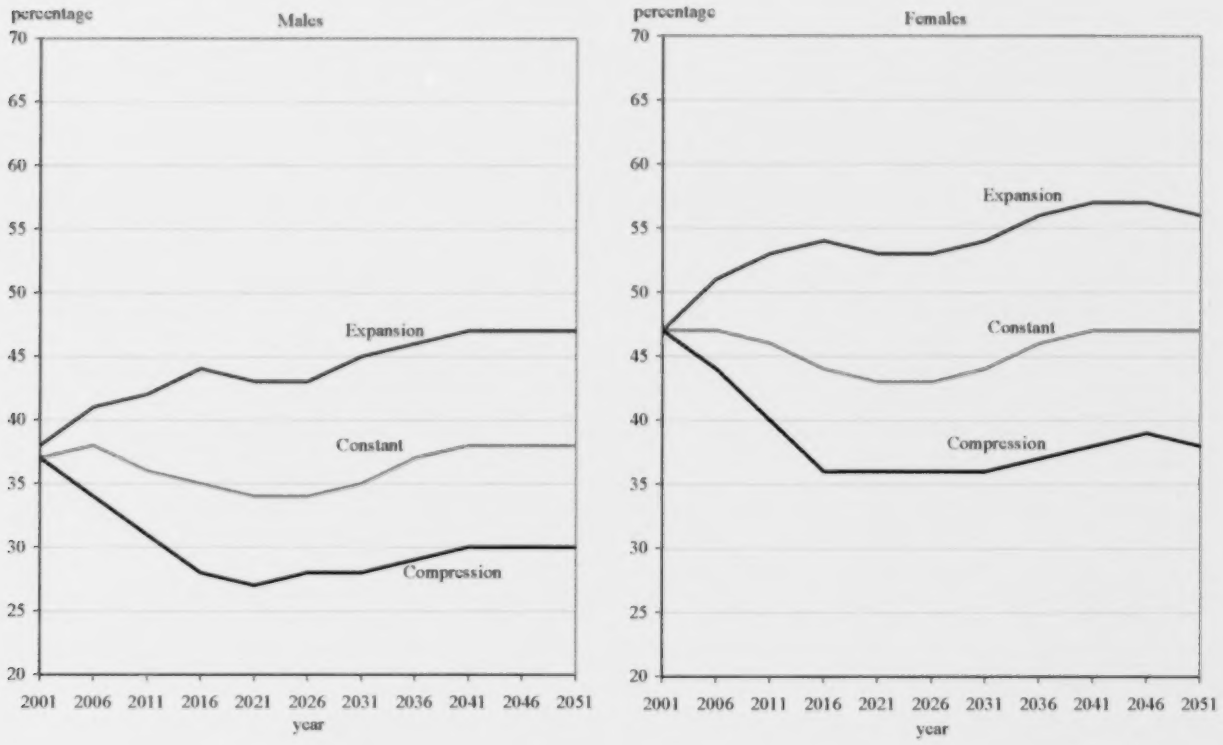
Three scenarios were produced to analyze future trends in disability among the elderly population living at home. The first scenario (constant scenario) simply applies the probability of having a given level of disability (none, mild, moderate or severe) as observed in 1996. These probabilities were computed after running a multinomial ordered logistic regression using data from the cross-sectional sample of the 1996 National Population Health Survey.

Results of this first scenario show that there is about a ten percentage point difference between males and females in favour of the former (figure 5). For males, the percentage of those 65 and over with a disability varies from a high of 38% to a low of 34%, while for females the percentage varies from 47% to 43%. The trends observed are affected by the arrival of the baby boomers among the younger elderly in 2011 and by their gradual aging to the 85 and over age group in 2031. Younger elderly being in better health than the oldest old, the gradual journey of the baby boomers through the older age groups will affect the proportion of elderly persons having a disability.

As can be seen in figure 5, different scenarios produce very different results. In the case of an expansion scenario, where the probability of having a disability is increased so that persons of a given age have the probability observed for someone 5 years older than them, there is an increase of about 10 percentage points. In the case of the compression scenario – the probability of having a disability being decreased to the level of someone 5 years younger – there is a decrease of about 7 percentage points. As we will see later, the effect on the demand for formal home care services is relatively important depending on the disability scenario.

The proportions mentioned above are strictly for the elderly population residing in a private household. Of

Figure 5
Proportion of disabled persons aged 65 years and over among those living in private households, by sex, Canada, 2001 to 2051




Source: Statistics Canada, Demography Division.

course, in a compression scenario we would expect less people living in an institution simply because of lower rates of disability and lower levels of disability. The opposite should be observed in the expansion scenario. Table 1 presents the projection results according to the different scenarios for 3 points in time. If we consider that persons needing more assistance are those with at least a moderate disability, adding to that those who live in an institution, we see a major difference between the scenarios. If the probability of having a disability stays stable at its 1996 level, 24% of the total elderly population would be in greater need of assistance in 2001 compared to 23% in 2031, and 26% in 2051. In the compression scenario, these proportions would respectively be 24%, 18% and 21%. In comparison, the expansion scenario shows proportions of 24%, 29% and 32%. The difference between these last two scenarios is very significant: In 2051 it is one out of three elderly persons that are in greater need of assistance in the expansion scenario compared to one in five in the compression scenario.

Although the growing number of elderly persons in the next few decades is going to be the main driver of need for services, the health of this population can play an important role on the impact of the aging of the baby boomers on the demand for home care services and long term care facilities.

The next section looks more closely at the need for assistance knowing that an important number of those with a disability have no need for assistance.

## The elderly population in need of assistance: numbers versus proportions

The main objective of this research is to estimate the future demand for home care services. Disability is only one measure of the possible demand since not everyone having a disability is in need of assistance. The projections take this process into account so we have a better idea of what the needs could be in the future. As can be seen in figure 6, the proportion of

Table 1
Distribution of the total population aged 65 years and over by disability status according to different disability scenarios, Canada, 2001, 2031 and 2051

| Disability status | Constant scenario | | | Compression scenario | | | Expansion scenario | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2001 | 2031 | 2051 | 2001 | 2031 | 2051 | 2001 | 2031 | 2051 |
| | percentage | | | | | | | | |
| None | 54.4 | 56.6 | 53.4 | 54.8 | 64.2 | 61.2 | 54.1 | 47.1 | 44.2 |
| Mild | 21.7 | 20.5 | 20.8 | 21.6 | 17.5 | 18.0 | 21.9 | 23.7 | 23.5 |
| Moderate | 14.4 | 13.3 | 14.1 | 14.2 | 10.5 | 11.1 | 14.5 | 17.1 | 18.0 |
| Severe | 5.0 | 4.7 | 5.1 | 4.9 | 3.5 | 3.8 | 5.1 | 6.5 | 7.0 |
| Institution | 4.5 | 4.9 | 6.6 | 4.5 | 4.3 | 5.9 | 4.4 | 5.6 | 7.3 |

Source: Statistics Canada, Demography Division.

those needing assistance is relatively constant throughout the whole period varying between 15% and 18%, the lowest point being attained in 2021-2026.

Although the proportion of elderly persons needing assistance might provide a rough measure of the health of this population, policy makers and service planners are obviously more interested in the number of elderly who might require home care services than in their proportion. For example, between 2001 and 2021 the proportion of elderly persons needing assistance slightly decreases from 17% to 15%. During the same period their number is increasing quite significantly from 619,000 to close to 950,000, an increase of more than 33%. As far as planning for services, these results are extremely important. The actual increase in numbers is the greatest for the 2021 to 2026 period, the constant scenario showing an increase of more than 160,000 for this period. According to this scenario, by 2031 the number of elderly persons living at home in need of assistance could have more than doubled. The increase then slows down considerably and for the last five-year period of the projections this increase is of only 11,000 people. At that time, the oldest cohorts among the baby boomers have past away and they are slowly replaced by cohorts relatively smaller. However, we would then have more than 1.5 million people in need of assistance. Of course, different scenarios of disability provide other results. These will be discussed in the next section.

### 4.3 Source of assistance and projected demand

We first looked at an important part of the informal network by studying future trends in the proportion of elderly persons living alone and future trends in the proportion without any surviving children. Then we looked at possible trends in the health of the population by using three scenarios of disability. In the first case, the analysis was done using transition probabilities within the microsimulation model. The second part was done using cross-sectional data looking at factors associated with different levels of disability and need for assistance. By combining these two approaches we get a picture at different points in time of the proportion and number of elderly persons using the three sources of assistance we have identified. Of course, this is all based on the patterns of utilization observed in 1996.

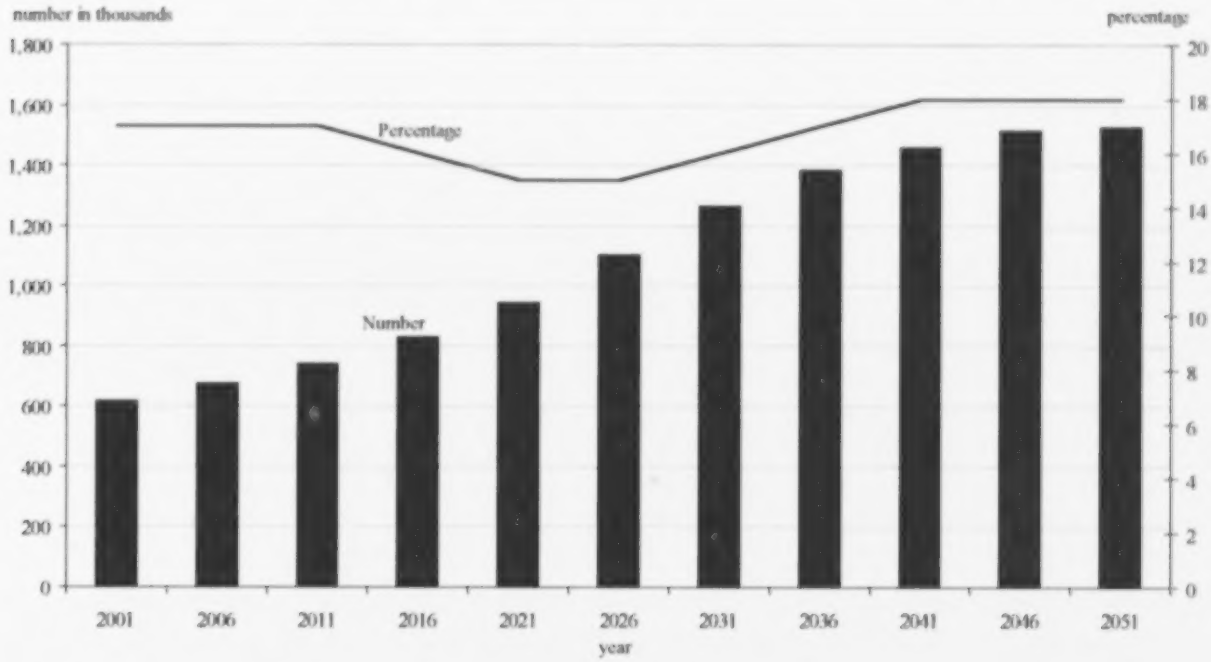
At the national level, data suggest that there will be a relative and absolute increase in the use of the formal network while there will be a relative decrease in the use of the informal network among disabled elderly for the period 2001 to 2031. In fact, during this period, the gap between the proportion of those using only the informal network and those using only the formal network almost disappears (figure 7). Moreover, when looking at future trends regarding disabled females we observed that the proportion using strictly the formal network may become more important than the proportion using strictly the informal network.

#### The impact of future trends in disability on the demand for home care services

Earlier, we mentioned the importance of numbers over proportions when planning for home care services. We also saw (figure 6) that the number of disabled elderly in need of assistance could possibly double between 2001 and 2031. These numbers reflected the impact of keeping constant the probabilities of having

Figure 6

Proportion and number of persons aged 65 years and over needing assistance using the baseline scenario, Canada, 2001 to 2051




Source: Statistics Canada, Demography Division.

a disability observed in 1996. Our scenarios of compression and expansion of disability were specifically designed to estimate the effect of the health of the elderly population on the future demand for home care services. Using the constant probabilities scenario, the average annual growth rate of the population in need of assistance is 2.5% for the period 2001 to 2031 (table 2). The pressure on the formal network being greater than for the informal network, this growth rate increases to 2.7% for the former compared to 2.2% for the latter.

It is interesting to note the effect of different trends in the health status of the elderly population. In the case of an improvement in the health status of this population (according to the hypothesis presented in this document earlier), the average annual growth rate could be as low as 1.9% for the population in need and 2.1% for the use of formal home care services. On the contrary, an expansion of disability would increase significantly the annual growth rate of disabled elderly needing assistance between 2001 and 2031. The scenario presented in this document shows that it could increase up to 3.1% annually. As for the use of formal home care services, it could go up as high as 3.4% annually. Of course, the effect of population health also reflects on the growth in the number of elderly persons living in an institution. According to our scenarios, it could vary between 2.9% and 3.3%.

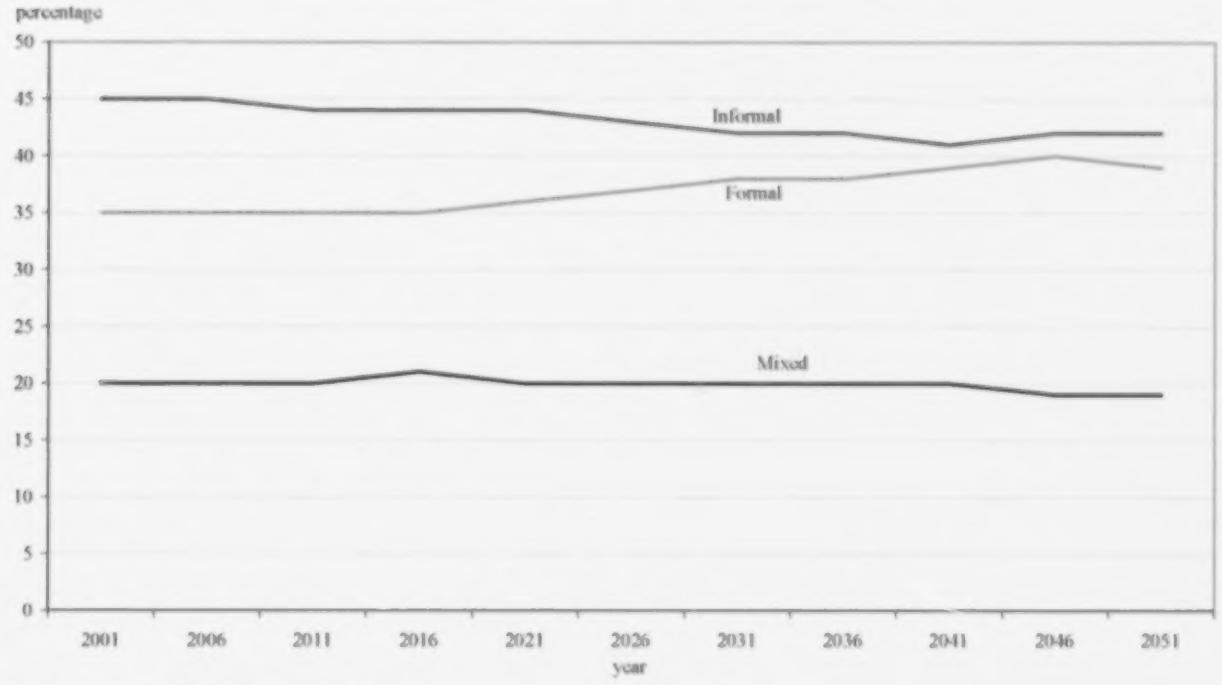
Table 2

Annual growth rate of the population aged 65 years and over receiving assistance by source of assistance and disability scenario (constant, compression, expansion), Canada, 2001 to 2031

| Source of assistance | Constant scenario | Compression scenario | Expansion scenario |
|---|---|---|---|
| | percentage | | |
| Population aged 65 years and over | 2.6 | 2.7 | 2.5 |
| Population in need | 2.5 | 1.9 | 3.1 |
| Formal | 2.7 | 2.1 | 3.4 |
| Institution | 2.9 | 2.6 | 3.3 |
| Informal | 2.2 | 1.5 | 2.8 |

Source: Statistics Canada, Demography Division.

Figure 7
Percentage distribution of disabled persons aged 65 years and over living in private households needing assistance by source of assistance, Canada, 2001 to 2051




Source: Statistics Canada, Demography Division.

Policies regarding institutionalisation of disabled elderly will obviously have an impact on the number of people needing home care services. Future policies regarding institution versus home care issues being very difficult to predict, our results are based on data observed in 1996 regarding the rates of institutionalisation by age, sex and marital status while taking into account the probability of getting into an institution considering the level of disability of the person.

## 5 Discussion and conclusions

Before discussing the results of this research there are several limits that have to be acknowledged. For instance, when looking at the needs of the disabled elderly population, this research is not measuring unmet needs. For example, if someone is receiving assistance strictly from the informal network, but also stating not receiving enough assistance, one could argue that there is a need for the formal network to provide some assistance to this person. The projections could hardly account for this pressure on the formal network. Among the characteristics that are accounted for when estimating the probability of receiving assistance from different sources, we are not looking at the health status and the geographic proximity of children. The latter would seem to be more of a problem as having a child is not merely enough to assume he or she will be able to provide assistance. Among the many factors that may affect the probability for a child of providing assistance to a disabled parent, geographic proximity is certainly an important one. This information was not collected in the 1996 General Social Survey.

If the health status of the children is more or less important considering that the majority of them have not reached old age yet, it certainly would be important to know the health status of the spouse. The spouse being the main provider of assistance for those living with a partner, information regarding their health status would surely help in understanding why some disabled elderly receive assistance from their spouse while others, living with a partner, do not receive assistance from this source. This is especially true when the person in need of assistance is among the oldest age group. The spouse is likely very old and may not be in a position of providing assistance. However, the information on the health status of the spouse is not collected in the 1996 General Social Survey. This is why "age of spouse" has been included in the model on source of assistance. Although this is just a proxy we can assume that those in the 65 to 74 age group are probably doing better regarding health than those in the 85 and over age group. The results of the analysis give an indication of the importance of knowing the health status of the spouse when studying factors associated with the use of different sources of assistance.

The research is also limited in its interpretation by the fact that the number of hours of services provided by different sources of assistance was not studied. By simply projecting the number of disabled elderly using a given support network, it is impossible to look at the impact on human resources needed to respond to the demand and to the overall cost of such a demand.

The results of this research provide valuable information on future trends regarding the availability of children and spouses for providing assistance, the number of disabled elderly in need of assistance, and the potential use of formal and informal networks. Population aging being in good part the result of lower fertility, one would expect that the proportion of elderly without any surviving children will increase in the future. However, the results show that in the near future the proportion of those without any surviving children among those with greater needs for assistance, the oldest old, will be lower than what has been observed in the recent past. This trend shows that until 2021, this proportion will decrease down to 16% (versus 22% in 2001). Even though the proportion will rise after that point, only in 2036 will it raise to the level observed in 2001.

As far as the living arrangement of elderly persons, trends indicate that among those living in private households the proportion living alone should be relatively stable, even decreasing somewhat among females in the longer term. All things being equal, a greater proportion of elderly persons living with a spouse would relieve some of the pressure on the formal network. This positive impact might however be neutralized because of aging spouses not being able to provide adequate assistance because of failing health. This positive effect could be dampened in part when joint survivorship is also meaning joint disability.

Looking at disability, of course the major driver of the number of disabled elderly is the aging of the baby boomers. With constant probabilities of disability over time, the proportion of disabled elderly between 2001 and 2031 will be just below the proportion observed in 1996. This is in part related to the arrival of the baby boomers within the older age group. At first they are among those aged 65 to 74, an age group with lower probability of disability. It is also related to their improved level of education, a characteristic having a positive effect on health. Overall, for the period 2001 to 2031, the average annual growth rate of the number of disabled elderly needing assistance could be about 2.5%. One important result of the projection was to show how significant an improvement in the health of the population could be on this number. According to the hypothesis presented earlier, this annual rate could be as low as 1.9%.

The major advantage of the microsimulation model used in this research was to allow the possibility of accounting for all these changes in the population – disability, family network, personal characteristics – to look at future trends in the use of the formal and

informal networks. Among all the trends that were projected, it is clear that the pressure on the formal network will be greater in the future. Of course, assumptions on the future health of the population are very important, so are the assumptions regarding institutionalization rates among the elderly population. This increasing pressure would definitely command an increase in the resources available for home care services, be it from the public or private sector. The question of availability of human resources for home care services will be an issue in the coming years as the baby boomers reach old age.

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